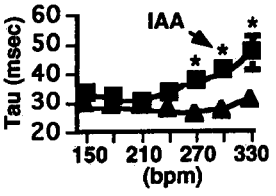
paced, isovolumically-beating pig hearts (N = 13, < 3 days of age), underwent non-recirculating, retrograde-aortic perfusion (37ºC) with a well-oxygenated buffer solution containing 2% BSA, insulin (100 μU/ml) and either: 5.5 mM glucose (Control) or 5.5 mM glucose, 50 μM iodoacetate to inhibit glycolysis and 5.5 mM pyruvate to sustain oxidative metabolism (IAA). Left ventricular (LV) balloon volume was fixed at ≅ 0.07 ml/g_{wet}. LV peak systolic pressure (PSP), end diastolic pressure (EDP), $-dP/dt_{max}$ and the relaxation time constant (Tau) were determined. Hearts were perfused with a pressure of 60 mmHg during 3 consecutive periods: 1) Baseline, HR 150 bpm (30 min.), 2) Generation of HR-response curve and 3) Tachycardia (Tach), HR 300 bpm (30 min.). During Baseline, PSP, EDP, $-dP/dt_{max}$ and Tau averaged 122 ± 6 mmHg, 5.7 ± 0.3 mmHg, 1279 ± 102 mmHg/sec and 30 ± 3 msec; and 127 ± 8 mmHg, 6.7 ± 0.7 mmHg, 1233 ± 127 mmHg/sec and 32 ± 2 msec, for Control and IAA, respectively. During Tach, the values were 84 ± 4 mmHg, 9.7 ± 1.7 mmHg, 1000 ± 92 mmHg/sec and 29 ± 5 msec; and 73 ± 4 mmHg, 31.8 ± 4.1* mmHg, 546 ± 89* mmHg/sec and 68 ± 6* msec, for Control and IAA, respectively. For IAA, the HR-response curve was markedly shifted (Fig).



For each HR studied, PSP *did not* significantly differ between Control and IAA. In conclusion, inhibition of glycolysis in neonatal pig hearts severely impairs LV relaxation.

1043-65 Sarcoplasmic Reticulum Calcium-ATPase mRNA Level Decreases in Pressure-Overloaded Fetal Lamb Ventricle

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The mRNA concentration of the Sarco(endo)plasmic Reticulum Calcium-ATPase (SERCA-2a) increases in the left ventricle (LV) during ontogenic development but decreases during pressure overload-induced hypertrophy. Because an increase in LV afterload is common in congenital heart diseases, we investigated whether such an increase alters the normal ontogenic program of SERCA-2a gene expression in the fetal lamb LV. In 9 fetal lambs, we performed a preductal coarctation of the aorta by banding the aortic arch (CoA) *in utero* at mid-gestation and a sham-operation in 9 twins (T). All fetuses were studied 4 weeks later for LV pressure, anatomical, histological and molecular measurements. LV SERCA-2a mRNA concentration was assessed by Northern blot hybridization using a rat cDNA probe and normalized to 18S ribosomal RNA. Surgery resulted in a severe coarctation of the aorta in all CoA but not in T as assessed by a marked decrease in the diameter of the preductal aorta (0.8 ± 0.4 mm vs 4.2 ± 0.6 mm, p < 0.0001) associated with a major increase in the pressure gradient through the aortic arch (31.9 ± 6.5 mmHg vs 2.4 ± 1.9 mmHg; p < 0.0001) in the former compared to the latter. This was associated with a 65% increase in the LV weight to body weight ratio in CoA as compared with T (p < 0.001). The two groups did not differ in their mean LV pressures, peak positive and negative dP/dt and LV cardiomyocyte transverse diameter. Northern blot analysis using the SERCA-2a specific cDNA revealed a single sharp hybridization band around 4.4 Kb for each fetal RNA sample. Importantly, the LV concentration of SERCA-2a mRNA in CoA decreased to 28.6% its value in T (p = 0.003). *Conclusion:* Regarding SERCA-2a gene expression in the lamb LV, the pathological process of pressure overload-induced hypertrophy overrides and/or slows down the physiological process of the ontogenic maturation without altering cardiac pump function

1043-66 Impaired Pulmonary Vascular Relaxation in Tetralogy of Fallot

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Pulmonary endothelial function and smooth muscular response to nitoric oxide donor agents in Tetralogy of Fallot (TF) remains unknown, although the abnormalities are well documented in patients with pulmonary hypertension. Accordingly, we examined endothelial dependent and non-dependent vasodilative ability of pulmonary artery in 7 patients (1.8 ± 0.9 years) with TF and 6 controls with normal pulmonary hemodynamics. Flow velocity (FV) and integral (FI) were measured with use of a Doppler-tip flow wire (Cardiometrics) placed in peripheral pulmonary artery during incremental infusion of acetylcholine (ACH 10^{-8}, 10^{-7}, 10^{-6}M) and nitroglycerine (0.5, 1.0 μg/kg/min) into the artery. In contrast to the dose dependent increase in pulmonary flow indices (FV and FI) to ACH and NTG stimulation, there is less increase in FV and FI in TF patients. Maximum increase ratio of both indices (% FV and % FI) to each stimulation were significantly depressed in TF patients than in control (ACH:100 ± 21% vs 153 ± 20% in % FV, 99 ± 18% vs 146 ± 28% in % FI) (NTG: 121 ± 14% vs 155 ± 23% in % FV, 119 ± 20% vs 138 ± 18% in % FI). In addition, % FV and % FI to ACH were significantly correlated with pulmonary to systemic flow ratio (Qp/Qs) (r = 0.84 in % FV, r = 0.79 in % FI) and mixed venous saturation (r = 0.71 in % FV, r = 0.66 in % FI), and % FV to NTG was also correlated with Qp/Qs (r = 0.68) and mixed venous saturation (r = 0.50). These data suggest that decreased and hypoxic blood flow in TF patients attenuates both endothelial dependent and non-dependent pulmonary vascular relaxation.

1043-67 Endogenous Nitric Oxide-Related Compounds in Whole Blood are Increased in Patients with Congenital Heart Defects with Pulmonary Hypertension

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Inhalation of nitric oxide (NO) has been widely used for acute post operated patients with congenital heart defects (CHD) with pulmonary hypertension (PH). Large left to right shunt with PH in CHD results in imbalance between vasoconstricting factors and NO endogenously produced by pulmonary artery endothelial cells. We determined NO-related compounds in whole blood of CHD patients and evaluated the relationship between PH and endogenous NO. Twenty three patients (age 6 months to 5 years) were divided into three groups, [group 1]: no shunt, PH (−), [group 2]: shunt (+), PH (−), Pp/Ps < 0.4, [group 3]: shunt (+), PH (+), Pp/Ps > 0.4. Whole blood were taken from right atrium, pulmonary artery, wedge pulmonary artery and aorta at cardiac catheterization, then blood samples were stored at −20ºC until assay. All NO-related compounds in blood were determined by thermal liberation of NO from nitrosyl complexes with denaturing proteins and finally detection of resulting nitrate ion by chemiluminescence after an enzymatic conversion to nitrite using Sivers NO analyzer. Endogenous nitric oxide-related compounds in whole blood are significantly increased in group 3 patients (84.2 ± 9.3 μM) compared with group 1 and 2 (21.1 ± 1.9μM, 28.9 ± 6.4 μM, respectively) (P < 0.01). These results suggest that high flow left to right shunts might be leading to elevation of endogenous NO production by pulmonary artery endothelial cells.

1043-68 Predictive Value of Serum Cardiac Troponin T (cTnT) in Pediatric Patients at Risk for Myocardial Injury

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Biochemical markers of myocardial damage are not routinely used in children at risk for myocardial injury. We investigated the clinical utility of cTnT levels (CARDIAC T, Boehringer Mannheim Corp.) in pts at a pediatric hospital (0.1–30 yrs old) undergoing cardiovascular surgery (n = 19) or receiving doxorubicin for acute lymphoblastic leukemia (ALL) (n = 11) where detectable cTnT elevations were ≥ 0.03 ng/ml. In the 19 surgical pts, a significant correlation was noted between the surgical severity score determined prior to measuring cTnT (increasing severity: vascular, atrial, valvular, ventricular, ventricular resection) and the level of post-operative cTnT 0.3, 1.1, 0.7, 4.1, ≥ 11.2 ng/ml respectively) (r = 0.79, p < 0.0001). The post-operative cTnT level was significantly (p = 0.0083) associated with children who completed cardiovascular surgery with an open chest (n = 2, mean cTnT ≥ 17.7 ng/ml) compared with those with a closed chest (n = 16, mean cTnT = 1.73 ng/ml). The pre-operative cTnT level significantly (p = 0.007) predicted post-op survival; 15 pts had undetectable cTnT, 1 pt had a cTnT < 0.1 ng/ml, and cTnT was ≥ 0.1 ng/ml in the only 2 pts who died. Similarly, in the 11 ALL pts, cTnT elevation following initial doxorubicin predicted LV dilation and wall thinning by echocardiography 9 months (mean) later. The LV dimension z score adjusted for BSA was −0.72 SD for the 4 pts with cTnT < 0.03 ng/ml and 1.08 SD for the 7 pts with cTnT ≥ 0.03 ng/ml (r = 0.80 when the variable was treated as continuous, p = 0.003). LVED posterior wall thickness z score adjusted for BSA was −0.13 SD in the low cTnT group and −0.66 SD in the high cTnT group (r = 0.61, p = 0.044). In conclusion, elevations of serum cTnT in children appear to quantitatively relate to the severity of myocardial damage and predict subsequent subclinical and clinical morbidity and mortality. cTnT